

Code: ME4T2

II B.Tech - II Semester – Regular Examinations - JUNE 2014

**APPLIED THERMODYNAMICS
(MECHANICAL ENGINEERING)**

Duration: 3 hours

Marks: $5 \times 14 = 70$

Answer any FIVE questions. All questions carry equal marks

1. a) Explain the concept of mean temperature of heat addition in Rankine cycle? 7 M
b) How the efficiency and work done of the Rankine cycle changes with Regeneration? 7 M
2. What are the different types of boilers and explain any two of them with neat sketch? 14 M
3. a) Derive the expression for critical pressure ratio? 7 M
b) The inlet and exit temperatures of the nozzle are 57°C and 38°C , then calculate critical pressure ratio. Consider $\gamma = 1.4$. 7 M
4. a) What are the different methods to reducing the Wheel or Rotor speed? 10 M
b) Differentiate between impulse and reaction turbines? 4 M

5. a) Derive the condition for maximum efficiency in reaction turbines? 5 M
- b) A parson's reaction turbine, while running at 450 rpm consumes 33 tons of steam per hour. The steam at a certain stage is at 1.6 bar with dryness fraction of 0.85 and the stage develops 10 KW. The axial velocity of flow is constant and equal to 0.7 of the blade velocity. Find mean diameter of the drum and the volume of steam flowing per second. Take blade tip angles at inlet and exit as 40° and 25° respectively. 9 M
6. a) What are the different types of condensers. Explain any two of them? 8 M
- b) If a barometer stands at 760 mm and condenser vacuum is 710mm and temperature is 30°C , calculate the mass of air per kg of uncondensed steam? 6 M
7. a) Explain the working principle of reciprocating compressor with neat sketch? 8 M
- b) Derive the expression for minimum work condition for stage compressor? 6 M

8. Write a short note on
- a) Slip factor
 - b) Power input factor
 - c) Degree of reaction
 - d) Swept volume

14 M